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EXAMINER

VU, QUANG D

ART UNIT PAPER NUMBER

2811

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/789,485

Applicant(s)

STOLZE, THILO

Examiner

Quang D. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8,9 and 11-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8,9 and 11-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-6, 8-9, 11-13 and 14-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification never discloses the connecting region is designed such that a movement of one substrate regions dose not translate to an adjacent substrate region as claimed in claim 1.

The specification never discloses the connecting region is designed such that a movement of one substrate regions dose not translate to an adjacent substrate region as claimed in claim 14.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claims 1 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,280,193 to Lin et al.

Regarding claim 1, Lin et al. (figure 2) teach a power semiconductor module comprising a plurality of semiconductor components situated on a substrate, wherein

the substrate (36) is divided into a plurality of separate substrate regions (substrate [36] are separated by through-hole via [48]) and

one or a plurality of connecting regions (portions of the through-hole via [48]) are situated between adjacent substrate regions (portions of substrate [36]), wherein the connecting regions (portions of the through-hole via [48]) are designed such that a movement of one substrate regions does not translate to an adjacent substrate region.

Regarding claim 14, Lin et al. (figure 2) teach a power semiconductor module comprising: a plurality of substrate elements (plurality of substrate portion [36]) having top and bottom surface, each substrate element (36) comprising a semiconductor component (40, 42 or 44) arranged on the top surface of a substrate element (36);

one or a plurality of connecting regions (48) arranged between adjacent substrate regions (portions of substrate [36]) to form a continuous bottom surface, wherein the connecting regions (48) are desired such that a movement of one substrate regions (portions of substrate [36]) does not translate to an adjacent substrate region.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2, 13, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,280,193 to Lin et al. in view of US Patent No. 3,735,211 to Kapnias.

Regarding claim 2, Lin et al. teach the connecting regions (portions of through-hole via [48]) are formed by recesses the substrate regions (portions of substrate [36]). Lin et al. differ from the claimed invention by not showing a module housing enclosing the substrate regions. However, Kapnias (figure 2) teaches a housing (lid [32]) enclosing the substrate regions (31). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Kapnias into the device taught by Lin et al. in order to protect the package substrate.

Regarding claim 13, Lin et al. differ from the claimed invention by not showing the power semiconductor module has a housing, which has action points for a mechanical pressure application of the connecting regions, and the housing applies pressure to the individual substrate regions. However, Kapnias (figure 2) teaches a housing (lid [32]), which has action points formed between the lid (32) and the substrate (31). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Kapnias into the device taught by Lin et al. in order to protect the package substrate. The combined device shows the power semiconductor module has a housing, which has action points for a mechanical pressure application of the connecting regions, and the housing applies pressure to the individual substrate regions.

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Regarding claim 15, Lin et al. differ from the claimed invention by not showing a module housing enclosing the plurality of substrate elements. However, Kapnias (figure 2) teaches a housing (lid [32]) enclosing the plurality of substrate elements (31). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Kapnias into the device taught by Lin et al. in order to protect the package substrate.

Regarding claim 16, the combined device shows the connecting regions (Lin et al.; 48) are formed by recesses in the module housing.

7. Claims 3 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. in view of Kapnias, and further in view of US Patent No. 6,541,872 to Schrock et al.

Regarding claim 3, the disclosures of Lin et al. and Kapnias are discussed as applied to claim 2 above.

The combined device differs from the claimed invention by not showing the material recesses are slotted. However, Schrock et al. (figure 2) teach the substrate (12), which are comprised slots (33). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Schrock et al. into the device taught by Lin et al. and Kapnias because it is desirable to reduce stress of the package substrate.

Regarding claim 17, the disclosures of Lin et al. and Kapnias are discussed as applied to claims 15-16 above.

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The combined device differs from the claimed invention by not showing the material recesses are slotted. However, Schrock et al. (figure 2) teach the substrate (12), which are comprised slots (33). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Schrock et al. into the device taught by Lin et al. and Kapnias because it is desirable to reduce stress of the package substrate.

8. Claims 4 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,280,193 to Lin et al. in view of US Patent No. 5,639,989 to Higgins, III.

Regarding claim 4, Lin et al. differ from the claimed invention by not showing the substrate is a ceramic. However, Higgins, III teach the ceramic substrate (column 5, lines 42-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Higgins, III into the device taught by Lin et al. because it is desirable to provide heat-radiating and electrical resistance properties of the ceramic substrate.

Regarding claim 18, Lin et al. differ from the claimed invention by not showing the substrate is a ceramic. However, Higgins, III teach the ceramic substrate (column 5, lines 42-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Higgins, III into the device taught by Lin et al. because it is desirable to provide heat-radiating and electrical resistance properties of the ceramic substrate.

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9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. in view of Kapnias, and further in view of US Patent No. 5,639,989 to Higgins, III.

Regarding claim 5, the disclosures of Lin et al. and Kapnias are discussed as applied to claim 2 above.

The combined device differs from the claimed invention by not showing the substrate is a ceramic. However, Higgins, III teach the ceramic substrate (column 5, lines 42-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Higgins, III into the device taught by Lin et al. and Kapnias because it is desirable to provide heat-radiating and electrical resistance properties of the ceramic substrate.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. and Kapnias in view of Schrock et al., and further in view of US Patent No. 5,639,989 to Higgins, III.

Regarding claim 6, the disclosures of Lin et al., Kapnias and Schrock et al. are discussed as applied to claim 3 above.

The combined device differs from the claimed invention by not showing the substrate is a ceramic. However, Higgins, III teach the ceramic substrate (column 5, lines 42-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Higgins, III into the device taught by Lin et al., Kapnias and Schrock et al. because it is desirable to provide heat-radiating and electrical resistance properties of the ceramic substrate.

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11. Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. in view of Kapnias, and further in view of US Patent No. 6,602,121 to Halley.

Regarding claim 8, the disclosures of Lin et al. and Kapnias are discussed as applied to claim 2 above.

The combined device differs from the claimed invention by not showing the module housing, at least in the regions of the substrate regions, is such that it acts on the substrate regions with a spring force. However, Halley (figure 7) teaches the module housing (602) acts on the substrate (610) with a spring force (622). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Halley into the device taught by Lin et al. and Kapnias in order to make self-alignment between the housing and the substrate.

Regarding claim 19, the disclosures of Lin et al. and Kapnias are discussed as applied to claims 15-16 above.

The combined device differs from the claimed invention by not showing the module housing, at least in the regions of the substrate regions, is such that it acts on the substrate regions with a spring force. However, Halley (figure 7) teaches the module housing (602) acts on the substrate (610) with a spring force (622). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Halley into the device taught by Lin et al. and Kapnias in order to make self-alignment between the housing and the substrate.

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12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. and Kapnias in view of Schrock et al., and further in view of US Patent No. 6,602,121 to Halley.

Regarding claim 9, the disclosures of Lin et al., Kapnias and Schrock et al. are discussed as applied to claim 3 above.

The combined device differs from the claimed invention by not showing the module housing, at least in the regions of the substrate regions, is such that it acts on the substrate regions with a spring force. However, Halley (figure 7) teaches the module housing (602) acts on the substrate (610) with a spring force (622). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Halley into the device taught by Lin et al., Kapnias and Schrock et al. in order to make self-alignment between the housing and the substrate.

13. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. and Kapnias in view of Higgins, III, and further in view of US Patent No. 6,602,121 to Halley.

Regarding claim 11, the disclosures of Lin et al., Kapnias and Higgins, III are discussed as applied to claim 5 above.

The combined device differs from the claimed invention by not showing the module housing, at least in the regions of the substrate regions, is such that it acts on the substrate regions with a spring force. However, Halley (figure 7) teaches the module housing (602) acts on the substrate (610) with a spring force (622). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of

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Halley into the device taught by Lin et al., Kapnias and Higgins, III in order to make self-alignment between the housing and the substrate.

14. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al., Kapnias and Schrock et al. in view of Higgins, III., and further in view of US Patent No. 6,602,121 to Halley.

Regarding claim 12, the disclosures of Lin et al., Kapnias, Schrock et al. and Higgins, III are discussed as applied to claim 6 above.

The combined device differs from the claimed invention by not showing the module housing, at least in the regions of the substrate regions, is such that it acts on the substrate regions with a spring force. However, Halley (figure 7) teaches the module housing (602) acts on the substrate (610) with a spring force (622). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Halley into the device taught by Lin et al., Kapnias, Schrock et al. and Higgins, III in order to make self-alignment between the housing and the substrate.

15. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. in view of US Patent No. 6,424,026 to Mangtani.

Regarding claim 20, Lin et al. differ from the claimed invention by not showing a heat sink having a flat surface, wherein the continuous bottom surface of the plurality of substrate elements is arranged on the flat surface. However, Mangtani (figure 6) shows the heat sink (30), which is formed on the bottom surface of the substrate (13). Therefore, it would have been

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obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Mangtani into the device taught by Lin et al. because it is desirable to dissipate heat from the semiconductor chip.

Regarding claim 21, the combined device shows the module housing (Mangtani; 210) in the region between the substrate elements (Mangtani; 13) comprises action points for a mechanical pressure application of the connecting regions, and the housing applies pressure to the individual substrate elements.

Response to Arguments

Applicant's arguments with respect to claims 1-6, 8, 9 and 11-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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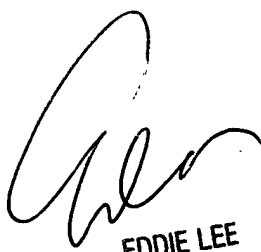
however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D. Vu whose telephone number is 571-272-1667. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qv
January 14, 2005



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